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The Effects of Stating Contingency-Specifying Stimuli on Compliance in Children

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The present investigation examined whether distinguishing between the discriminative and function-altering properties of contingency-specifying stimuli (CSS) is of heuristic value in conceptualizing child compliance. Groups of "compliant" and "noncompliant" children were instructed to place several blocks in a box. During half of the trials the children had an immediate opportunity to respond to the instruction (IOR), and during the other trials the children's opportunity to respond was delayed by 10 min (DOR). Results showed that 5 of the 8 children were more likely to comply in the IOR condition, whereas the 3 remaining children were equally compliant in IOR and DOR conditions. In addition, the study investigated the influence of condition presentation sequence on child compliance. Thus, half of the children entered the IOR condition first, and the other half entered the DOR condition first. Results showed no differences in compliance for 3 of 4 children in the IOR-first sequence. However, in the DOR-first sequence, all children, regardless of classification, were more compliant in IOR than in DOR conditions. Presentation order appeared to strongly influence compliance and could likely have affected the results of prior investigations.

Skinner's (1957, 1969) conceptual analysis has played an important role in stimulating basic research on verbal behavior and influencing the manner in which researchers have subsequently talked about rules and rule-governed behavior. Skinner (1969) defined a *rule* as a verbal description of behavioral contingencies or as a contingency-specifying stimulus (CSS). Specifically, he distinguished between behavior that is shaped through a direct conditioning history (i.e., contingency-shaped behavior) and behavior that is influenced by rules (i.e., rule-governed behavior). Following Skinner (1969), many behavior analysts have interpreted rules as verbal discriminative stimuli (e.g., Baldwin & Baldwin, 1981; Cerutti, 1989; Galizio, 1979). However, elaborating on Michael's (1980) analysis, some authors have argued that conceptualizing rules as verbal discriminative stimuli may be inappropriate in a number of circumstances (e.g., Blakely & Schlinger, 1987; Schlinger, 1993). Michael defined a *discriminative stimulus* as a stimulus that evokes a response because that response has been more successful in the presence than in the absence of that stimulus. This definition would appear to require that a stimulus be present in order to have discriminative or evocative effects, and, perhaps more important, implies a necessary history of reinforcement. However, some rules appear to control behavior even when stated far in advance of the response they are said to evoke. The rules are therefore not present during the onset of the behavior.

Consider the rule, "Come home when it gets dark."[1] According to

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[1] The consequences in rule statements are often implied. Some authors have deemed these

Schlinger's (1993) analysis, "returning home" cannot be considered to be under the discriminative control of this CSS. Specifically, "returning home" occurred hours after the statement of the contingency and thus is evoked by the onset of darkness rather than the statement (unless the person restates the rule to him or herself). Under most conditions CSSs may serve as discriminative stimuli and the conditioning history necessary to explain the effect on behavior may be quite obvious, but the discriminative or evocative functions of rules are probably not the only (or most important) function of verbal stimuli. Consequently, Schlinger (1990, 1993) has argued strongly for distinguishing between verbal stimuli that derive their control of behavior from a direct conditioning history and those verbal stimuli that seem to alter the function of other stimuli that control behavior. In addition, to help clarify usage of the term *rule,* Schlinger (1990) proposed that only verbal stimuli with distinct "function-altering" effects that arise in the absence of a direct conditioning history should be termed rules. The CSS, "Come home when it gets dark," is a rule because it alters the function of the onset of darkness. Darkness may evoke the behavior of returning home (or any other arbitrarily selected behavior) without a direct conditioning history.

According to Schlinger's (1993) analysis, little of the existing research said to involve rules or rule following can be considered to have examined the phenomena unambiguously. In fact, early studies of verbal stimuli and compliance appear to confound the discriminative and function-altering properties of the verbal stimuli employed, making it difficult to assess their potentially more interesting function-altering effects (e.g., Braam & Malott, 1990). Practically, though, it is difficult to separate the function-altering and evocative effects of verbal stimuli. Recently, two studies have attempted to investigate the utility of Schlinger's conceptual analysis and to address this difficulty (Mistr & Glenn, 1992; Reitman & Gross, 1996).

Mistr and Glenn (1992) imposed a 20-min delay between the delivery of the CSS and a child's opportunity to respond. When the opportunity to respond was delayed and children were compliant with the CSS, Mistr and Glenn argued that the CSS must have endowed the "sight of the toys" with evocative properties because the CSS was not present to evoke the behavior. Interestingly, children were less likely to comply when the opportunity to respond was delayed compared to conditions when the children had an immediate opportunity to respond, suggesting the evocative function of verbal stimuli is important in facilitating compliance among 4- and 5-year-old boys. However, methodological limitations hinder interpretation of the study. First, the immediate-opportunity-to-respond (IOR) and delayed-opportunity-to-respond (DOR) conditions were not identical (exclusive of the opportunity-to-respond parameter, of course). Thus, it is difficult to compare the results of the IOR and DOR manipulations. Also, participants were selected based on low levels of compliance to baseline requests; hence, these findings may not generalize to more compliant children.

A more recent study by Reitman and Gross (1996) attempted to address some of the issues raised in the Mistr and Glenn (1992) study. First, a screening procedure was used to select "compliant" and "noncompliant" children in an attempt to control for prior compliance history. Interestingly, when provided with an immediate opportunity to respond, both groups of children demonstrated high rates of compliance. However, when the opportunity to respond was delayed by 15 min, the compliant children continued

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rules "incomplete rules" (Malott, Whaley, & Malott, 1997). For the rules described here (e.g., come home when it gets dark), the consequences are implied (e.g., or you'll get no ice cream after dinner).

to exhibit high rates of compliance, but in the noncompliant group task completion decreased by 20%. These data suggest that noncompliant children may have greater difficulties with CCSs that have primarily function-altering as opposed to evocative effects.

The Reitman and Gross (1996) study also had methodological limitations. Specifically, all children entered the IOR conditions first. When children entered the DOR conditions, they had already experienced a brief, but potentially influential, conditioning history (i.e., for picking up blocks in that setting). Without this history of reinforcement, both groups of children may have been less likely to pick up the blocks in the second experiment. The authors also suggested that more stringently defined noncompliant children may have responded differently than the mildly noncompliant boys.

The present study attempted to replicate and extend the findings of Reitman and Gross (1996), using a more stringently defined noncompliant population. Children were selected for the noncompliant group based on scores from the Compliance Test (Bean & Roberts, 1981) and the ADHD Index of the Conners Parent Rating Scale—Revised (CPRS-R; Conners, 1997). The current investigation also attempted to control for sequence effects by counterbalancing entry into the IOR and DOR conditions.

We hypothesized that, as in earlier studies (cf. Reitman & Gross, 1996), both compliant and noncompliant groups of children would exhibit a high rate of compliance with CSSs that provided an immediate opportunity to respond. Second, compliant children were hypothesized to be as likely to comply when the opportunity to respond was delayed as when the opportunity to respond was immediate, whereas noncompliant children were anticipated to show decrements in compliance under this condition. Finally, we predicted that children entering the DOR condition first would exhibit lower rates of overall compliance than the children entering the IOR condition first.

METHOD

Participants

Participants were recruited from a rural Head Start program with an enrollment of 240 children. Four noncompliant boys, as well as 4 comparison boys, were selected for study. The mean age for both groups was 3.5 years old. A modified version of the Compliance Test (Bean & Roberts, 1981) was used to provide a direct measure of child noncompliance. In the present version of the task, mothers were provided with 20 specific two-part commands (e.g., "Larry, pick up this ball, and put it in the truck"), and compliance was then rated for each command. The Compliance Test has been shown to be a reliable and valid method of assessing child noncompliance (Brumfield & Roberts, 1998). The CPRS-R (Conners, 1997) is one of the most widely used clinical assessment tools for evaluating disruptive behavior problems among children. In addition to other subscales, ratings on the CPRS-R are combined to create the Conners ADHD Index, which includes criteria for an ADHD diagnosis. Elevated scores on the ADHD Index were used as selection criteria because some researchers have suggested that children with ADHD exhibit deficits in rule-governed behavior (among a variety of other difficulties, including "impaired delayed responding"), which may be of theoretical interest to developmental, clinical, and basic researchers who investigate child compliance (Barkley, 1990, 1994, 1997).

Children were selected for the noncompliant group if parental consent was obtained, the child was compliant with less than 70% of parental commands during the Compliance Test, and they had a T score of at least 65 (1.5 standard deviations above the mean) on the ADHD Index of the CPRS-R. Compliant children were chosen for the study provided that they

were in the same preschool class as a participant in the noncompliant group, parental consent was obtained, they were compliant with better than 97% of parental commands during the Compliance Test, and they had a T score below 55 on the ADHD Index of the CPRS-R. Noncompliant and compliant boys were also matched on age, race, and socioeconomic status.

Apparatus

The experimental apparatus was identical to that used by Reitman and Gross (1996). Children were instructed to place 88 blocks into a plastic utility box (2 ft by 1 ft by 1 ft) with a hole (2 in. by 1 in.) cut into the lid. The blocks were of the standard wooden variety with multiple colors and shapes (e.g., red, blue, orange, and green; triangles, squares, and round cylinders). A "goodie box" containing a variety of tangible items (e.g., matchbox cars, stickers, figurines, etc.) was located outside of the classroom to minimize the disruption stemming from the distribution of the toys. The toys had been shown to function as reinforcers in earlier studies (e.g., Reitman & Gross, 1996).

Design

To examine possible sequence effects, the study employed an ABAB design for half of the children and a BABA design for the other half. Although the A in most designs usually represents baseline trials, there were no baseline trials presented in the study. Thus, the IOR condition was arbitrarily assigned the A, and the DOR condition was assigned the B. Between-participants effects were examined for the noncompliant and compliant groups, and within-participant effects were examined for the opportunity-to-respond variable. All children participated in both the IOR and DOR conditions. Each phase consisted of five trials, and each boy participated in a total 20 trials (10 each of immediate and delayed opportunity to respond). Immediate rewards were available following compliance in both conditions. Table 1 shows the experimental conditions and their presentation order.

Table 1

Experimental conditions and sequence.

Group	Condition sequence	*n*
Compliant	IOR-DOR-IOR-DOR (ABAB)	2
Compliant	DOR-IOR-DOR-IOR (BABA)	2
Non-compliant	IOR-DOR-IOR-DOR (ABAB)	2
Non-compliant	DOR-IOR-DOR-IOR (BABA)	2

Note. IOR = immediate opportunity to respond; DOR = delayed opportunity to respond.

General Procedure

The study was conducted in preschool classrooms from 10:00 a.m. until 12:00 p.m., 4 days per week for 8 weeks. The experimenter approached participants during free play, and a CSS was stated indicating the child would earn a prize from the goodie box for picking up blocks. The phrase "I don't care if you pick them up or not," was included to diminish implied social consequences for compliance. Noncompliant and compliant pairs participated in the same condition on each day, and no more than two trials were presented to each child during the day.

Data Collection and Interobserver Reliability

After the experimenter deposited the blocks on the floor, he moved to the other side of the room (approximately 20 feet away from the child) and casually monitored compliance with the CSS statement. The experimenter (and an independent observer on 24% of the trials) counted the number of blocks placed in the box during each 10-s interval. The child was scored as non-

compliant if he failed to place all of the blocks in the box within 10 min. A trial was terminated and the performance was rated as noncompliant if the child did not place any blocks in the box for two consecutive minutes. Interobserver reliability was calculated for 38 of 160 trials (24%). Agreement for number of blocks placed in the box was calculated by dividing the lesser number of blocks by the larger number of blocks for each trial and multiplying by 100%. Reliability was estimated to be 97% and ranged across participants from 91% to 100%. Reliability was 100% for total task completion (compliance).

Immediate Opportunity to Respond (IOR)

During the IOR condition the experimenter approached the child and said, "Here are some blocks for you to pick up now. I don't care if you pick them up or not. If you pick up all the blocks now, you may pick a prize from the goodie box when you are finished." The experimenter spilled the blocks next to the child and observed from the other side of the room. The experimenter provided performance feedback and access to the goodie box immediately following compliance. The experimenter said, "You followed the rule about picking up the blocks, now you can go to the goodie box." If the child did not comply with the rule the experimenter said, "You did not follow the rule about picking up the blocks right away, now you cannot pick a prize from the goodie box."

Delayed Opportunity to Respond (DOR)

During the DOR condition the experimenter said, "Here are some blocks for you to pick up later. I don't care if you pick them up or not. If you pick up the blocks later when I dump them out, you may pick a prize from the goodie box as soon as you are finished." After the rule was stated, the experimenter left the room for 10 min. Upon reentering, the experimenter spilled the blocks onto the floor near the child, making sure that the child could see the blocks. Other elements of the procedure were the same as in the IOR condition.

Independent and Dependent Variables

Opportunity to respond, group membership, and the sequence of conditions served as the three independent variables. Opportunity to respond (i.e., immediate vs. delayed) served as a within-participant variable, and group membership (i.e., noncompliant vs. compliant) and the sequence of conditions were both between-participants variables. The dependent variable was measured dichotomously because almost all children who initiated the task subsequently completed it. That is, the child was scored as compliant during a session if he placed all 88 blocks inside the box within 10 min. The child was rated as noncompliant if he did not place all of the blocks inside the box within 10 min or if he stopped working for 2 min.

RESULTS

Table 2 presents rates of compliance for the noncompliant and compliant children for each condition. These data are represented graphically in Figure 1. Overall, the compliant group complied 83% of the time, and the noncompliant group complied 54% of the time. A Wilcoxon signed ranks test showed that children in the noncompliant group were significantly less likely to comply than children in the compliant group ($z = -1.83$, $p < .05$). Also, these differences were maintained across IOR and DOR conditions. That is, during the IOR conditions all compliant children exhibited higher rates of compliance, and during the DOR conditions 3 of the 4 compliant children exhibited higher rates of compliance than did noncompliant children (Pair 3 exhibited the same rate of compliance in the DOR conditions). Thus, the selection criteria used for the present

Table 2

Task completion by condition for compliant and noncompliant groups.

		Immediate Opportunity to Respond		Delayed Opportunity to Respond		Total	
Group	Child	Ratio	Percentage	Ratio	Percentage	Ratio	Percentage
Compliant							
	C1	10/10	100	10/10	100	20/20	100
	C2	10/10	100	10/10	100	20/20	100
	C3	6/10	60	2/10	20	8/20	40
	C4	10/10	100	8/10	80	18/20	90
Subtotal		36/40	90	30/40	75	66/80	83
Noncompliant							
	N1	8/10	80	4/10	40	12/20	60
	N2	9/10	90	9/10	90	18/20	90
	N3	5/10	50	2/10	20	7/20	35
	N4	4/10	40	2/10	20	6/20	30
Subtotal		26/40	65	17/40	43	43/80	54
Total		62/80	78	47/80	59	109/160	68

Note. Immediate rewards were available in all conditions. Ratios are presented as the number of tasks completed/tasks presented. The percentage is the percentage resulting from the ratio. The ABAB design was used for Pairs 1 and 2 and the BABA design was used for Pairs 3 and 4.

study appeared to be successful in distinguishing noncompliant and compliant children.

With respect to the opportunity-to-respond variable, 5 children demonstrated higher rates of compliance during the IOR condition, 3 children demonstrated equivalent and high rates compliance in the IOR and DOR conditions (i.e., 100%, 100%, and 90%), and no children exhibited higher rates of compliance in the DOR condition (see Figure 1). A Wilcoxon signed ranks test was conducted to test for a main effect for opportunity to respond and supports the conclusion that, overall, children were significantly less likely to comply when the opportunity to respond was delayed by 10 min ($z = -2.04$, $p < .05$). Interestingly, sequence effects appeared to influence performance in the IOR and DOR conditions. Only 1 child (N1) who entered the IOR condition first (the ABAB sequence) was less likely to comply in the DOR condition than in the IOR condition. By contrast, all 4 children that entered the DOR condition first (the BABA sequence) were less likely to comply in the DOR condition than in the IOR condition.

Overall differences in compliance between the ABAB and BABA sequences were also evaluated. When averaged together, the children in the ABAB group were compliant 88% of the time, and children in the BABA group were compliant 49% of the time. A Mann-Whitney U test showed that children entering the BABA sequence were less likely to comply across all conditions ($z = -1.90$, $p < .05$). Individual data also support lower rates of compliance for children in the BABA sequence. For example, the 2 noncompliant children in the BABA sequence were less compliant than the noncompliant children in the ABAB sequence. Similarly, compliant children in the BABA sequence were less

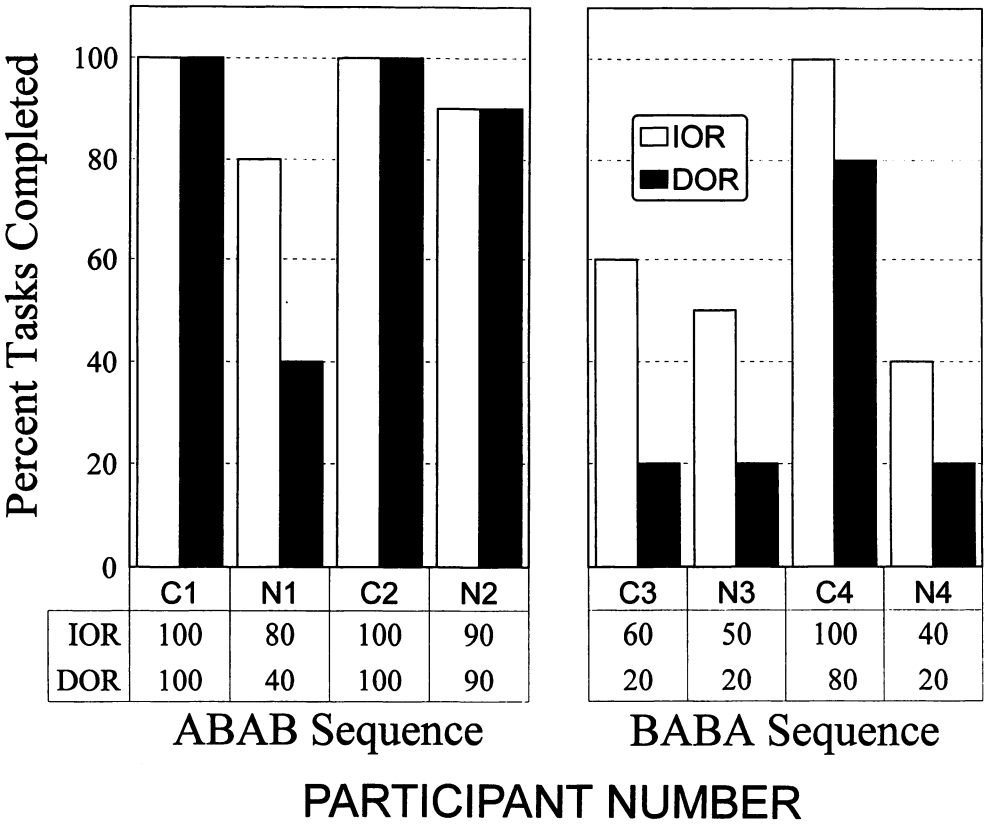

Fig. 1. Task completion for all conditions. C1 = compliant child, Pair 1; N1 = noncompliant child, Pair 1. IOR = immediate opportunity to respond; DOR = delayed opportunity to respond. ABAB sequence = child enters the IOR condition first, DOR second, IOR third, and DOR fourth. BABA sequence = child enters the DOR condition first, IOR second, DOR third, and IOR fourth.

likely to complete the task than compliant children in the ABAB sequence (except for C4 during the IOR condition). Taken together, these data suggest that condition presentation sequence had a systematic influence on compliance.

Interestingly, a few children picked up some, but not all, of the blocks on several trials (i.e., compliance was initiated but not sustained). The data were summarized to ascertain whether differences emerged based on the opportunity-to-respond variable when children were partially compliant. In the IOR condition children were partially compliant (i.e., picked up 1 to 87 blocks) 56% of the time, and in the DOR condition children were partially compliant 61% of the time. Thus, children did not appear to be partially compliant significantly more often in either the IOR or DOR conditions.

DISCUSSION

The present investigation sought to extend the research on rule-governed behavior to a sample of children that more closely approximates a noncompliant clinical population of children and to evaluate the utility of drawing a distinction between evocative and function-altering CSSs. As in the Reitman and Gross (1996) study, the present investigation utilized both compliant and noncompliant children; however, the noncompliant group was more stringently defined in the present study and sequence effects were systematically examined.

The prediction that both groups of children would exhibit high rates of compliance in the IOR condition was supported with a significant qualification. In the ABAB sequence (IOR first), both noncompliant and compliant children completed greater than 80% of the tasks. However, high rates of compliance were not consistently observed in IOR conditions during the BABA (DOR first) presentation sequence (60%, 50%, 100%, and 40% compliance; see Figure 1). Thus, the assertion that high rates of compliance will be observed in IOR conditions appears to be influenced substantially by condition presentation sequence.

We predicted that children in the compliant group would maintain high rates of task completion, whereas noncompliant children were expected to be significantly less compliant in the DOR conditions relative to IOR conditions (see Reitman & Gross, 1996). Consistent with this prediction, 3 of 4 children in the compliant group remained highly compliant in the DOR condition (C1, C2, and C4). Similarly, 3 of 4 noncompliant children were less compliant in DOR than IOR conditions (N1, 40% vs. 80%; N3, 20% vs. 50; N4, 20% vs. 40%). However, when differences between IOR and DOR conditions are examined by pairs (e.g., C1 vs. N1, see Figure 1), only the first pair of children showed the expected difference. That is, the noncompliant member of the pair (N1) showed a reduction in compliance for the DOR condition relative to IOR performance, whereas the compliant member (C1) showed maintenance of task completion across conditions. Consequently, differences in task completion did not appear to be systematically influenced by the interaction of past compliance history (as defined here) and CCSs of varying types.

Comparing data from the IOR and DOR conditions provides some support for Schlinger's (1993) analysis of rules. Specifically, when the opportunity to respond to the verbal stimulus was immediate, the rule statement possibly had both evocative and function-altering properties. However, when the opportunity to respond was temporally separated from the behavior it was intended to evoke, children in both groups were less likely to comply. This result was much more likely to be observed when the DOR condition was presented first (BABA sequence). One possible explanation for this result is that when the DOR condition was presented first, some of the evocative functions of the CSS were eliminated, isolating the function-altering effects. By contrast, introducing the IOR condition first (ABAB) may more readily reveal the evocative effects of the CSS and somehow confound subsequent DOR conditions in the sequence, providing higher levels of compliance. Alternately, some researchers might argue that the children may have "forgotten the rule," implying that children may self-state CSSs during the 10-min delay, but the partial compliance data are inconsistent with this interpretation. Specifically, when children were partially compliant, they were equally likely to have initiated compliance in the IOR and DOR conditions. If children were more likely to forget the rule in the DOR condition, it would be expected that they would have exhibited partial compliance less frequently in that condition. In summary, although the rule statement appeared to exert some influence over the behavior of 3- to 4-year-old children, it seemed to be less effective in generating compliance when separated from its evocative effects, especially in the BABA sequence. Presumably, this occurs because the CSS alters the evocative functions of seeing the toys dumped out.

To evaluate sequence effects, the present study employed an ABAB design for half of the children and a BABA design for the other half. We predicted that children entering the DOR condition first (i.e., BABA) would be less compliant. This hypothesis was supported for both the noncompliant and the compliant groups.

One explanation may involve the schedule of reinforcement experienced by the participants. Because most children were less likely to comply in the DOR condition, they were also less likely to come in contact with potential reinforcement (the goodie box) in the earlier trials. Mace et al.'s (1988) concept of behavioral momentum may also be relevant to the present discussion. Specifically, to produce behavioral momentum (i.e., an increased likelihood of compliance), researchers first distinguish between high-probability and low-probability commands. These researchers have demonstrated that participants are more likely to comply with low-probability rules if they are first given high-probability rules. Presumably, "this sequence increases compliance to the low-probability command by establishing a high rate of reinforcement for compliance contiguous to the low-probability request" (Mace & Belfiore, 1990, p. 508). In the present study, the IOR condition may represent a form of high-probability rule, and the DOR condition represents a low-probability rule. Children exposed to the high-probability rule first were generally more likely to comply during future trials than were children first exposed to low-probability rules.

Given the results of the present study, one cannot discount the possibility that order or sequence effects may have influenced the outcome and interpretation of previous studies of noncompliance and CSSs. Although sequence effects are often considered to be undesirable, in the present research the influence of presentation order was examined by counterbalancing the IOR and DOR conditions. The methodology of the present study may thus be useful in future studies of rule-governed behavior with children, but it could be improved. Clearly, further methodological improvements are needed if we are to better understand the role of verbal stimuli on compliance. For example, the proximity of the experimenter to the children could have influenced compliance. To address such an issue, in the DOR condition, perhaps the experimenter should briefly approach the child after dumping the blocks without saying anything to the child or making a task-irrelevant comment.

The present investigation attempted to determine if the distinction between the evocative and function-altering properties of CSSs is of practical value in conceptualizing child noncompliance. Indeed, the overall difference in compliance rates in the IOR and DOR conditions provides some support for the value of the distinction and warrants further investigation. Showing that children are less likely to comply when the opportunity to respond is delayed has some practical implications. For example, correspondence training may be used to increase compliance when the opportunity to respond is delayed (e.g., Baer, 1990). Correspondence training consists of having the child repeat a CSS as soon as it is provided (e.g., "I will come home when it gets dark") and rewarding the correspondence between what the child says and does. This may be modified by cuing the child to repeat the rule at a later time as well (e.g., "It is now dark so I will go home"). The next step in this research must be to elaborate on the kinds of reinforcement histories that form the building blocks of control through exposure to CSSs with function-altering properties (i.e., rules). As with research on stimulus equivalence, such research will almost certainly involve working with infants and very young children as they begin experimenting with verbal stimuli.

There are a few limitations to the present study. First, the small number of participants, and to some extent the small number of trials, makes it difficult to generalize the results to larger groups of children. Second, although an attempt was made to use a more stringently defined group of noncompliant children than was used previous research (Reitman & Gross, 1996), the children in this study may not adequately represent clinically noncompli-

ant groups of children (i.e., children who have been diagnosed with behavior disorders). Thus, future investigations may benefit from utilizing previously diagnosed groups of children. In addition, empirically defining reinforcers and the addition of a no-reinforcer control group would have strengthened this study.

In conclusion, the results indicated that preschool children were less compliant when the opportunity to respond was delayed, although compliance was also influenced to a small degree by the child's past history of compliance (i.e., noncompliant vs. compliant) and to a stronger degree by the order in which they were exposed to experimental conditions. Continuing to distinguish between the evocative and function-altering effects of CSSs may be useful in advancing our understanding of child behavior problems, but the importance of the sequencing of these stimuli must also be carefully evaluated in investigations involving compliance and CSSs. The present results suggest that rule-governed behavior deficits may not be unique to children classified as noncompliant but rather that stimulus control explanations of noncompliance that focus on the reinforcement contingencies maintaining noncompliant behavior may still be viable (e.g., Willis & Lovaas, 1977). Nevertheless, there may yet emerge circumstances in which particular behavioral problems may be associated with deficits or difficulties complying with function-altering CSSs. Finally, the strength of the sequence effects observed in this study also supports the notion that greater attention needs to be paid to basic behavioral phenomena such as schedules of reinforcement and behavioral momentum if we are to progress in our understanding of noncompliance and related phenomena.

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